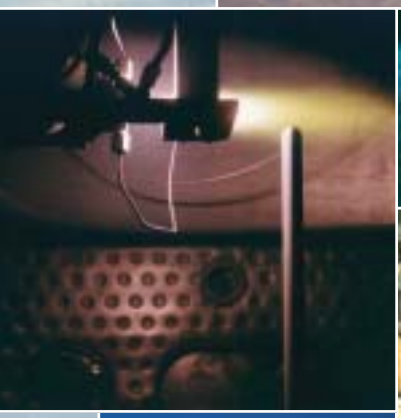


# 5th Conference

# AMPET

## Aerospace Materials, Processes, and Environmental Technology

**September 16, 17 & 18, 2002**
**Von Braun Center**
**Huntsville, Alabama**

# AMPET CONFERENCE PROGRAM

The **5th Conference on Aerospace Materials, Processes, and Environmental Technology (AMPET)** is the premier venue in which the materials and processes, manufacturing, and environmental communities showcase technologies vital to the evolution of safer, operational, next-generation, reusable and expendable aeronautics and space vehicle systems. During the conference, aerospace practitioners describe, review, and critically assess advances in technologies for upgrading existing systems and developing future airframe, propulsion, transportation, and structural hardware systems.

## Program Information

**Beth Cook, Technical Program Chair**
**Phone: (256) 544-2545** **Fax: (256) 544-5877**
**E-mail: beth.cook@msfc.nasa.gov**

## Tutorials

Monday morning offers several first-time opportunities: bonus tutorials by experts in aerospace fields.

- Oxygen Compatibility: an introduction to hazards associated with oxygen systems and safe management of these risks. For technicians, designers, and managers who work with and are responsible for oxygen systems. (Dr. Harold Beeson, WSTF)
- Space Environmental Effects (SEE): a discussion of the ISO draft procedure standardizing SEE testing, organizations specializing in SEE testing, determination of facilities to accommodate specific requirements, and cost of SEE testing. (Dr. Dave Edwards, MSFC)
- Chemical Fingerprinting Program: an overview of the program used to "screen" selected critical raw materials to ensure that no supplier process, contamination, or subtle material change is unknowingly allowed to affect shuttle elements. (Dr. William McClennen, ATK Thiokol, and Dr. Doris Smith, Lockheed Martin)
- Future of Air Emissions Regulations: a class on the EPA's process for developing future regulations and MACT standards for hazardous air pollutants. (Rick Coyler, EPA)

## Pre-Conference Tours

On Monday afternoon, tour several of Huntsville's science and technology enterprises:

- The Waste-to-Steam Facility, which burns 690 tons/day of municipal solid waste, significantly reducing the volume of garbage to be landfilled, and which supplies energy in the form of steam to the U.S. Army's Redstone Arsenal, virtually eliminating the Arsenal's dependence on its own steam plants.
- The National Space Science and Technology Center, a collaborative research/education organization advancing Earth science, space science, materials science, biotechnology, propulsion, advanced optics, information science.
- Sci-Quest, The North Alabama Science Center, a hands-on science center for all ages.

**Buses will depart from the Hilton Huntsville at 1:00 pm. All participants must pre-register. Plan to dress comfortably!**

## Welcoming Reception

Top off Monday's tours by joining us at the conference Welcoming Reception! Take this opportunity to network with old friends and meet new people. We will enjoy an evening of art and southern hospitality at the Huntsville Museum of Art, conveniently located across the street from the conference host hotel.

## Exhibits

Visit our exhibit hall, filled with displays on the latest government and industry research and development projects. The conference is also an ideal opportunity for your company to showcase products, ideas, and expertise relevant to aerospace materials, processes, and environmental technology.

**To exhibit, contact:** **Jodi Weiner**
**P.O. Box 928** **Phone: (256) 533-5923**
**Huntsville, AL** **Fax: (256) 534-9899**
**35804-0928 USA** **E-mail: jweiner@aol.com**

## Exhibitors' Reception

Tuesday evening, after a full day of conference sessions, relax and enjoy hors d'oeuvres and other refreshments with our conference exhibitors and your colleagues. Network with hundreds of people who share your concerns and perspectives. The reception will be in the Von Braun Center, North Hall.

## Demonstrations & Posters

Between sessions, enjoy demonstrations of advanced materials and manufacturing techniques. Discuss innovative concepts, theories, or prototype systems. Browse the poster area, observe the displays, and engage the presenters in discussion. On Tuesday evening, enjoy poster presentations on scientific and technical research projects related to aerospace materials, processes, environmental technology, or manufacturing.

## Conference Schedule

### *September 16 • Monday*

| | |
|---|---|
| 8:00 am – 12:00 noon | Tutorials |
| 9:30 am – 5:00 pm | Exhibitor Setup at VBC |
| 12:00 pm – 1:00 pm | Conference Registration |
| 1:00 pm – 5:00 pm | Pre-Conference Tours |
| 6:00 pm – 7:30 pm | Welcoming Reception |

### *September 17 • Tuesday*

| | |
|---|---|
| 7:00 am | Registration Opens |
| 8:00 am – 9:15 am | Opening Session |
| 9:15 am – 6:30 pm | Exhibit Hours |
| 10:00 am – 5:30 pm | Sessions |
| 5:30 pm – 6:30 pm | Exhibitors' Reception |
| 6:00 pm – 7:00 pm | Poster Session |

### *September 18 • Wednesday*

| | |
|---|---|
| 7:30 am – 2:00 pm | Exhibit Hours |
| 8:00 am – 4:00 pm | Sessions |

# Fifth Conference on
# Aerospace Materials, Processes, and Environmental Technology

September 16 - 18, 2002 • Von Braun Center • Huntsville, Alabama

## September 16, 2002

**8:00 am - 12:00 noon** — **Tutorials**

**9:30 am - 5:00 pm** — **Exhibitor Setup at Von Braun Center**

**12:00 noon - 1:00 pm** — **Early Conference Registration at the Hilton Huntsville**

**1:00 pm - 5:00 pm** — **Pre-Conference Tour**

**6:00 pm - 7:30 pm** — **Welcoming Reception at the Huntsville Museum of Art**

## September 17, 2002

**8:00 am**

**Conference Welcome & Introduction** — **Paul M. Munafo, Manager, Materials, Processes, and Manufacturing Department, NASA/MSFC**

**Keynote Addresses**

**Norine Noonan, Director, National Space Science and Technology Center**

**Robert Sackheim, Assistant Director and Chief Engineer for Space Propulsion, NASA/MSFC**

**9:15 am - 10:00 am** — **Break – Exhibit Area**

**10:00 am - 12:00 noon**

### *SESSION 1*

A1 – Pollution Prevention Efforts

***Session Chair: Farley Davis, Marshall Space Flight Center***

- Urban Plant Potentiality for VOC Detoxification
  I.I. Patalakh, National Academy of Sciences of the Ukraine
- JSC Metal Finishing Waste Minimization Methods
  Erica N. Sullivan, Johnson Space Center
- Analysis for the Presence of Antibiotics in the ISS Water Reclamation System
  Don Obenhuber, Engineering Research Corporation
- Design for the Environment
  Gene Harm, United Space Alliance
- Waste Water Recycling at Space Launch Complex 6
  Rhonda Cardinal, Boeing

### *SESSION 2*

A2 – Innovative Inspection Techniques

***Session Chair: Sam Russell, Marshall Space Flight Center***

- Fatigue Crack and Porosity Measurement in Composite Materials by Thermographic and Ultrasonic Methods
  James L. Walker, Marshall Space Flight Center
- Quantitative Remaining Life Assessments for Aerospace Components using Photon Induced Positron Annihilation (PIPA)
  Douglas W. Akers, Positron Systems, Inc.
- Acoustography-Based Inspection of Composites
  Jas Sandhu, Santec Systems, Inc.
- NDE of Friction Stir Welds on the Space Shuttle External Tank
  David Kinchen, Lockheed Martin Space Systems
- Ultrasonic Contamination Application Technique for Contaminated Calibration Standards and Bond Study Substrate
  Odell Huddleston, ATK Thiokol

### *SESSION 3*

A3 – Advancements in Manufacturing and Repair

***Session Chair: Mel Bryant, Marshall Space Flight Center***

- Hydrogen Torch Braze for SSME Nozzle Tube Repair
  Jack Weeks, Boeing, Rocketdyne Power and Propulsion
- Evaluation of New Repair Methods for Seal Surface Defects on RSRM Hardware
  Stephanie Stanley, ATK Thiokol
- Microgravity Manufacturing
  Ken Cooper, Marshall Space Flight Center
- Advanced Material Developments with Laser Engineered Net Shaping
  Glenn Williams and Preston McGill, Marshall Space Flight Center

**12:00 noon - 1:30 pm** — **Lunch, Exhibits, and Demonstration**

## September 17, 2002 *continued*

**1:30 pm - 3:30 pm**

### *SESSION 1*

B1 – Environmental Regulatory Issues

***Session Chair: Gail Murphree-Grafton, United Space Alliance***

- The Puget Sound Clean Air Agency Aerospace NESHAP
  Rick Hess, Puget Sound Clean Air Agency
- Miscellaneous Organic NESHAP and Impact on Thiokol's Manufacture of Explosives and Pyrotechnics
  Brian Howick, ATK Thiokol
- NASA's Principal Center for Review of Clean Air Act Regulation
  Marceia Clark-Ingram, Marshall Space Flight Center
- Protecting the Global Environment – The Role of Industrial Process Engineers
  Tom Morehouse, Technology and Economics Assessment Panel of the Montreal Protocol, United Nations Environment Programme

### *SESSION 2*

B2 – Advanced Materials I

***Session Chair: Ron Daniel, Boeing-Rocketdyne***

- Metal Matrix Composite LOX Turbo Pump Housing via Novel Tool-less Net-Shape Pressure Infiltration Casting Technology
  Sandeep Shah, Marshall Space Flight Center
- Advancements in Binder Systems for Solid Freeform Fabrication
  Ken Cooper, Marshall Space Flight Center
- Environmentally Compatible Vapor-Phase Corrosion Inhibitor for Space Shuttle Hardware
  Howard Novak, United Space Alliance
- Evaluation of EL-Form Rhenium for Zero Erosion Materials
  Richard Foedinger, DE Technologies
- Syntactic Metals: A Survey of Current Technology
  Ray Erikson, ETA Flight Materials Group

### *SESSION 3*

B3 – Information Tools

***Session Chair: Bruce Askins, Marshall Space Flight Center***

- AP2 Integrated Technology Database
  David Crawford, International Trade Bridge, Inc.
- Improving Profits with Materials Optimization in Manufacturing
  Chris Nunez, Centor Software Corporation
- NASA Materials Related Lessons Learned
  Paul Gill, Marshall Space Flight Center
- Colossal Tooling Design: 3D Simulation for Ergonomic Analysis
  Steve Hunter, Mississippi State University

**3:30 pm - 4:00 pm** **Break – Exhibits and Demonstration**

**4:00 pm - 5:30 pm**

### *SESSION 1*

C1 – Evaluation of Solvent Substitutes

***Session Chair: Howard Novak, United Space Alliance***

- Selection of a Non-ODC Solvent for Rubber Processing Equipment Cleaning
  Richard Morgan, ATK Thiokol
- Case Study on Hazardous Chemical Replacement – Solvent Paint Strippers Replaced by Dry Media Blasting
  Richard Buckholz, Vought Aircraft Industries, Inc.
- Ozone Friendly Solvent Alternatives for Aerospace Applications
  Abid Merchant, DuPont
- Evaluation of Cleaning Solvents for Oxygen Systems
  Eric Eichinger, Boeing

### *SESSION 2*

C2 – Advanced Materials II

***Session Chair: Jill Keen, ATK Thiokol***

- Optical Properties of Thin Film Molecular Mixtures
  Donald A. Jaworske, Glenn Research Center
- Development of Lightweight Material using High Strength Fibers against Space Debris Impacts
  Makoto Tanaka, Tokai University
- Replacement of Ablators with Phase-Change Material for Thermal Protection of STS Elements
  Raj Kaul, Marshall Space Flight Center
- Using Isothermal Microcalorimetry to Determine Compatibility of Structural Materials with High-Test Hydrogen Peroxide (HTP) Propellant
  Rudy Gostowski, Marshall Space Flight Center

### *SESSION 3*

C3 – Technical Standards and Aerospace Materials

***Session Chair: Paul Gill, Marshall Space Flight Center***

- NASA Technical Standards Program
  Bill Vaughn, Marshall Space Flight Center
- Standardization Efforts for Mechanical Testing and Design of Advanced Ceramic Materials and Components
  Jonathan Salem, Glenn Research Center
- Standards Development Activities at WSTF
  Harold Beeson, White Sands Test Facility
- Corrosion of Highly Specular Vapor Deposited Aluminum (VDA) on Earthshade Door Sandwich Structure
  Daniel Plaskon, Jet Propulsion Laboratory

**5:30 pm - 6:30 pm** **Exhibitors' Reception**

**6:00 pm - 7:00 pm** **Poster Session**

## September 18, 2002

**8:00 am - 10:00 am**

### *SESSION 1*

D1 – Surface Cleanliness Inspections

***Session Chair: Dewitt Burns, Marshall Space Flight Center***

- Fluorescent Cleaning Process
  Jim Deardorff, Superior Coatings, Inc.
- Analysis Of Non-Volatile Residues with a Standard FTIR Accessory, The Vsphere™
  Martin Szczesniak, Surface Optics Corporation
- Recent Improvements in Contaminant Detection
  Wanda Hudson, ATK Thiokol
- Use of FT-IR Analysis to Support Contamination Studies for Bonding Surfaces
  Richard Boothe, Marshall Space Flight Center
- A Study of Stains on Metals using Infrared Hyperspectral Imaging
  G. L. Powell, Y-12 National Security Complex

### *SESSION 2*

D2 – Materials Test Methods and Evaluation I

***Session Chair: Ben Coby, Boeing-Rocketdyne***

- Corrosion Prevention Compound Evaluation Method
  Sarah J. H. Kuhlman, University of Dayton Research Center
- Infrared Spectroscopy as a Chemical Fingerprinting Tool
  Tim Huff, Marshall Space Flight Center
- Reference Material Kydex-100 Test Data Message for Flammability Testing
  Carl Engel, Qualis Corporation
- The Effect of Gravity on the Combustion Synthesis of Porous Biomaterials
  Martin Castillo, Colorado School of Mines
- The Effect of Molding and Machining on the Dimensional Stability of Neoflon CTFE M400H Polychlorotrifluoroethylene Rod Stock and Valve Seats
  Jess Waller, Honeywell Technology Solutions, Inc.

### *SESSION 3*

D3 – Advanced Manufacturing Research

***Session Chair: John Vickers, Marshall Space Flight Center***

- Cryogenic Microcracks Growth in Polymer Composites
  David Hui, University of New Orleans
- Development of Self-Healing Composites for Cryogenic Hydrogen Tanks
  Richard Patton, Mississippi State University
- Prediction of Microcracking Induced Permeability of Cryogenic Composite Tanks
  John Whitcomb, Texas A&M University
- Solid-State Friction Stir Welding
  George Buchanan, Tennessee Technological University
- Non-Autoclave Processing of Large Re-Usable Aerospace Structures
  Al Loos, Virginia Polytechnic Institute

**10:00 am - 10:30 am** — **Break – Exhibits and Demonstration**

**10:30 am - 12:30 pm**

### *SESSION 1*

E1 – Environment-Friendly Cleaning Products and Processes

***Session Chair: Rick Golde, ATK Thiokol***

- Clean Machining with New Volatile Lubricant Fluid
  Dean S. Milbrath, 3M Performance Materials Division
- Novec™ Engineered Fluids
  David Hesselroth, 3M Performance Materials Division
- Cleaning to 6 Sigma Standards
  Donald Bowden, Bowden Industries
- Real World Cleaning without Chemicals
  John B. Durkee, Creative EnterpriZes

### *SESSION 2*

E2 – Materials Test Methods and Evaluation II

***Session Chair: Harold Beeson, White Sands Test Facility***

- Durable Surface Contamination Standards
  Paul Shelley, The Boeing Company
- Effects of Thermal Exposure on Properties of Al-Li Alloys
  Sandeep Shah, Marshall Space Flight Center
- Hydrogen Permeability of Composite Tank Materials under Biaxial Strain
  Erik Stokes, SRI
- Micro-Raman Analysis of Irradiated Diamond Films
  Robby Newton, Marshall Space Flight Center
- Cleaning Silicone from RSRM Hardware using Potential TCA Replacement Solvents and the Double-Wipe Method
  Wanda Hudson, ATK Thiokol

### *SESSION 3*

E3 – Developments in Metallic Processes

***Session Chair: Ralph LeBoeuf, Lockheed Martin Space Systems***

- High Strength and Wear Resistant Aluminum Alloy for High Temperature Applications
  Jonathan A. Lee, Marshall Space Flight Center
- Aluminum Lithium Alloys Use for Reusable Future Launcher Cryogenic Metallic Tanks
  Eric Grosjean, EADS Launch Vehicles
- Vacuum Plasma Spray Forming of Copper Alloy Liners for Regeneratively Cooled Liquid Rocket Combustion Chambers
  Frank Zimmerman, Marshall Space Flight Center
- JG-PP Lead-free Solder Project
  Brian Greene, International Trade Bridge, Inc.

**12:30 pm - 2:00 pm** — **Lunch, Exhibits, and Demonstration**

**2:00 pm - 4:00 pm**

***SESSION 1***

F1 – Synthesis of Nano Materials

***Session Chair: Biliyar Bhat, Marshall Space Flight Center***

- Characterization of Carbon Nanotube Reinforced Nickel
  Hansel Gill, Marshall Space Flight Center
- Synthesis and Coating of Nanoparticles
  Abraham Ulman, Polytechnic University
- A New Process for the Deposition of Nanostructured Thin Films from Size-Classified Nanoparticles
  Renato P. Camata, University of Alabama at Birmingham
- A "Ship-in-the-Bottle Approach" to Synthesis of Nano Materials via Sonolysis
  Devinder Mahajan, Brookhaven National Laboratory

***SESSION 2***

F2 – Composite Cryotank Processing

***Session Chair: James Walker, Marshall Space Flight Center***

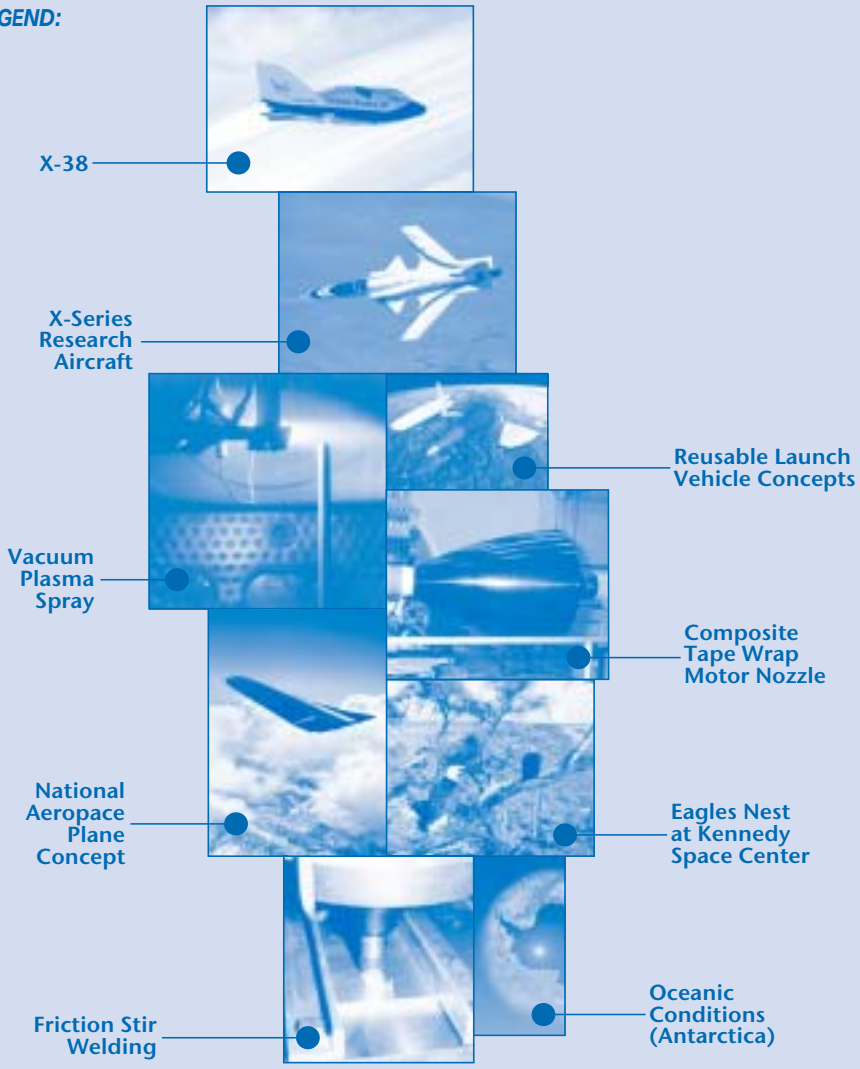
- Rotational Molding of Thermotropic Liquid Crystal Polymers
  Paul Clark, Luna Innovations, Inc.
- Manufacturing Process Simulation of Large-Scale Cryotanks
  Majid Babai, Marshall Space Flight Center
- Development of Segmented Composite Toroidal Tanks
  Thomas DeLay, Marshall Space Flight Center
- Linerless Tanks for Space Application: Design and Manufacturing Considerations
  Brian Jones, Kaiser Compositek, Inc.

**4:00 pm** **End of Conference**

***NOTE:* Each speaker is allotted 20 minutes of presentation time and 5 minutes for questions and answers.**

*The program committee reserves the right to change, reschedule, or cancel a speaker or presentation at any time.*

***COVER LEGEND:***




5th Conference
AMPET
Aerospace Materials, Processes, and Environmental Technology

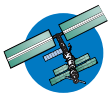
# GENERAL INFORMATION

## Be There!

Take advantage of this valuable opportunity to share, learn, and network with others in your profession. Participate in this forum to describe, review, and critically assess environmentally driven replacement technologies and the latest manufacturing advances from the standpoint of their significance, application, impact on aerospace systems, and use by the research and development community. Check our website for links to other exciting events in Huntsville: http://ampet.msfc.nasa.gov.

## Registration

Complete and return the registration form by mail or by fax (256) 534-9899 or call (256) 533-5923. Registration will be confirmed only upon receipt of full payment by check, credit card, or a purchase order included with the registration form. Checks should be made payable to ICRC. The registration fee includes admission to the two-day conference, Monday Tutorial and Pre-Conference Tours, Monday evening Welcoming Reception, Tuesday evening Exhibitors' Reception and Poster Session, two lunches, refreshment breaks, and conference material.



## Hotel Accommodations

The Hilton Huntsville is the host hotel for this event. A block of rooms is available for the special conference rate of $70 single/double, if reservations are made before August 16, 2002. Be sure to mention that you will be attending the conference to ensure the special rate. You may make reservations by calling the Hilton Huntsville directly at (256) 533-1400 or 1-800-544-3197.

## Registration Desk

The registration desk will be open Monday, September 16, from 12:00-1:00 pm at the Hilton Huntsville and Tuesday and Wednesday, September 17-18, beginning at 7:00 am in the Von Braun Center, North Hall Gallery.

## Registration Information

Jodi Weiner
E-mail: jweiner@aol.com
Phone: (256) 533-5923
Fax: (256) 534-9899

## Cancellation Policy

Failure to attend an activity does not constitute withdrawal. ICRC must be notified of intent to withdraw either by phone or in writing. Conference fees are refundable if cancellation is received on or before July 16, 2002. Later cancellations will necessitate full payment of the conference fee. Participant substitutions may be made at any time.

## 4 Convenient Ways To Register

1. MAIL a completed registration form with your check, credit card information, or company purchase order number to: Jodi Weiner, P.O. Box 928, Huntsville, AL 35804-0928
2. FAX a completed registration form to (256) 534-9899. Fax registrations must include a MasterCard, Visa, or company purchase order number.
3. PHONE (256) 533-5923. We accept MasterCard, Visa, or your company purchase order number.
4. ON LINE at our website: http://ampet.msfc.nasa.gov.

# REGISTRATION FORM

***PLEASE TYPE OR PRINT CLEARLY***

## 5TH CONFERENCE ON AEROSPACE MATERIALS, PROCESSES, AND ENVIRONMENTAL TECHNOLOGY

If registering for more than one person, please list additional names and information on an attached sheet or a copy of this form.

FEES: Conference registration fee includes admission to the two-day conference, Pre-Conference Tutorial and Tours, Welcoming Reception, Exhibitors' Reception, Poster Session, two lunches, refreshment breaks, and conference materials.

| | | |
|---|---|---|
| Early Conference Fee *(by August 1, 2002)* | $295 | _____ |
| Conference Fee *(after August 1, 2002)* | $345 | _____ |
| Speaker/NASA Employee Fee | $150 | _____ |

*(Government contractors are not considered NASA employees.)*

**Total Enclosed $ _____ to cover _____registration(s).**

SPECIAL CONFERENCE ACTIVITIES:

- ❑ I will be attending the Pre-Conference Tour.
- ❑ I will be attending this tutorial: _____.
- ❑ I will be attending the Welcoming Reception.
- ❑ I will be attending the Exhibitors' Reception.

Name _____
Dr. / Mr. / Ms. First Middle Last

Mailing Address _____ Apt/Ste # _____
❑ Home ❑ Business

City _____ State ____ Zip _____ Country _____

Organization _____

Home Phone (____) _____

Business Phone (____)_____Ext. _____

Fax (____) _____

E-mail: _____

If you have a disability that might require specific accommodations, please indicate _____

METHOD OF PAYMENT ❑ Session Chair *(no fee)*

- ❑ Check Enclosed *(Make payable to: ICRC)*
- ❑ Bill my organization Purchase Order # _____

Attn: _____

Billing Address: _____

City _____ State ___ Zip _____ Country _____

- ❑ MasterCard ❑ Visa

Card # _____ Exp. Date ___/___

Cardmember's Name _____

Cardmember's Signature _____

## SPONSORING AGENCIES

Marshall Space Flight Center

NASA's Materials Replacement Technology Team

Space Shuttle Program

NASA's Materials and Processes Working Group

National Center for Advanced Manufacturing

American Institute of Aeronautics and Astronautics

ASM International®

Aerospace Industries Association

Environmental Protection Agency

National Center for Manufacturing Sciences

University of New Orleans

## Who should attend?

- Materials Engineers
- Scientists
- Process Engineers
- Managers
- Environmental Engineers

## What Past Attendees Are Saying:

*"Exhibits and demos showcased several evolving technologies."*

*"Good mix of technical sessions and understanding of current issues and evolving technologies."*

*"Opportunity for industry and Government to interact on environmental issues."*

*"Wonderful opportunity to see and hear about the latest M&P for NASA systems."*

*"Excellent method to share knowledge and exchange tools."*

*"Exhibit area was great! We made lots of new contacts."*

## Past Conference Attendees:

3M
Aerojet
Allied Signal
Battelle
Boeing
California Institute of Technology
Delta Airlines
Department of the Navy
Dow Corning Corporation
DuPont
Environmental Protection Agency
Lawrence Livermore National Laboratory
Lockheed Martin
Northrup Grumman
Pennsylvania State University
Pratt and Whitney
Sikorsky Aircraft
Texas A&M University
The Johns Hopkins University
Thiokol Corporation Space Operations
US Air
US Air Force
US Army
US Coast Guard

5th Conference AMPET

Beth Cook
Technical Program Chair
Marshall Space Flight Center
ED30
Huntsville, AL 35812

## EXHIBITING?

You should be!

AMPET provides a great opportunity to reach your target market. See inside for details!